

## CLAIMS

What is claimed is:

- 1           1.     An apparatus comprising:  
2                 a cache of a current peer in a current ring at a current level to store information of  
3     ring peers within the current ring, the current ring being part of an hierarchical ring  
4     structure of peer-to-peer (P2P) nodes, the hierarchical ring structure having at least one of  
5     a lower level and an upper level; and  
6                 a peer locator coupled to the cache to locate a target peer in the cache in response to  
7     a request.
- 1           2.     The apparatus of claim 1, further comprising:  
2                 a peer interface coupled to the peer locator to interface to at least one of a first  
3     lower peer in a first lower ring at the lower level and a first upper peer in a first upper ring  
4     at the upper level, the peer interface to forward the request to search the target peer to at  
5     least one of the first lower peer and the first upper peer when the target peer is not located  
6     in the cache.
- 1           3.     The apparatus of claim 2, wherein the peer interface comprises:  
2                 a lower interface to interface to at least one of the first lower peer and a second  
3     lower peer in a second lower ring at the lower level, the lower interface to forward the  
4     request to at least one of the first and second lower peers to search the target peer when the  
5     target peer is not located in the cache.
- 1           4.     The apparatus of claim 3, wherein the lower interface to receive the request  
2     from at least one of the first and second lower peers to search the target peer.
- 1           5.     The apparatus of claim 2, wherein the peer interface comprises:  
2                 an upper interface to interface to at least one of the first upper peer and a second  
3     upper peer in a second upper ring at the upper level, the upper interface to forward the

4 request to at least one of the first and second upper peers to search the target peer when the  
5 target peer is not located in the cache.

1 6. The apparatus of claim 5, wherein the upper interface to receive the request  
2 from at least one of the first and second upper peers to search the target peer.

1 7. The apparatus of claim 2, wherein the cache stores information of at least  
2 one of the first and second lower peers.

1 8. The apparatus of claim 2, further comprising:  
2 a registrar to process registration of at least one of the current peer to the first upper  
3 peer and the first lower peer to the current peer, the registration including the information  
4 on one of the current peer, the first upper peer, and the first lower peer.

1 9. The apparatus of claim 1, wherein the peer locator comprises:  
2 an information retriever to retrieve the information of the target peer if the target  
3 peer is located in the cache.

1 10. The apparatus of claim 1, wherein the information includes an address of  
2 the target peer.

1 11. A method comprises:  
2 storing information of ring peers within a current ring at a current level in a cache  
3 of a current peer in the current ring, the current ring being part of an hierarchical ring  
4 structure of peer-to-peer (P2P) nodes, the hierarchical ring structure having at least one of  
5 a lower level and an upper level; and  
6 locating a target peer in the cache in response to a request.

1 12. The method of claim 11, further comprising:  
2 interfacing to at least one of a first lower peer in a first lower ring at the lower level  
3 and a first upper peer in a first upper ring at the upper level; and

4 forwarding the request to search the target peer to at least one of the first lower peer  
5 and the first upper peer when the target peer is not located in the cache.

1 13. The method of claim 12, wherein the interfacing comprises:  
2 interfacing to at least one of the first lower peer and a second lower peer in a  
3 second lower ring at the first lower level; and  
4 forwarding the request to at least one of the first and second lower peers to search  
5 the target peer when the target peer is not located in the cache.

1 14. The method of claim 13, wherein interfacing to at least one of the first  
2 lower peer and a second lower peer comprises:  
3 receiving the request from at least one of the first and second lower peers to search  
4 the target peer.

1 15. The method of claim 12, wherein interfacing comprises:  
2 interfacing to at least one of the first upper peer and a second upper peer in a  
3 second upper ring at the upper level; and  
4 forwarding the request to at least one of the first and second upper peers to search  
5 the target peer when the target peer is not located in the cache.

1 16. The method of claim 15, wherein interfacing to at least one of the first  
2 upper peer and a second upper peer comprises:  
3 receiving the request from at least one of the first and second upper peers to search  
4 the target peer.

1 17. The method of claim 12, wherein storing the information comprises:  
2 storing the information of at least one of the first and second lower peers.

1 18. The method of claim 12, further comprising:  
2 processing registration of at least one of the current peer to the first upper peer and  
3 the first lower peer to the current peer, the registration including the information on one of  
4 the current peer, the first upper peer, and the first lower peer.

1           19.     The method of claim 11, wherein locating comprises:  
2           retrieving the information of the target peer if the target peer is located in the cache.

1           20.     The method of claim 11, wherein storing the information comprises:  
2           storing an address of the target peer.

1           21.     A system comprising:  
2           a requesting peer to generate a request to search a target peer; and  
3           a current peer in a current ring at a current level, the current ring being connected to  
4           the requesting peer in an hierarchical ring structure of peer-to-peer (P2P) nodes, the  
5           hierarchical ring structure having at least one of a lower level and a upper level, the current  
6           peer including a P2P subsystem, the P2P subsystem comprising:  
7                 a cache to store information of ring peers within the current ring, and  
8                 a peer locator coupled to the cache to locate the target peer in the cache in  
9           response to the request.

1           22.     The system of claim 21, wherein the P2P subsystem further comprising:  
2           a peer interface coupled to the peer locator to interface to at least one of a first  
3           lower peer in a first lower ring at the lower level and a first upper peer in a first upper ring  
4           at the upper level, the peer interface to forward the request to search the target peer to at  
5           least one of the first lower peer and the first upper peer when the target peer is not located  
6           in the cache.

1           23.     The system of claim 22, wherein the peer interface comprises:  
2           a lower interface to interface to at least one of the first lower peer and a second  
3           lower peer in a second lower ring at the lower level, the lower interface to forward the  
4           request to at least one of the first and second lower peers to search the target peer when the  
5           target peer is not located in the cache.

1           24.     The system of claim 23, wherein the lower interface to receive the request  
2           from at least one of the first and second lower peers to search the target peer.

1           25.     The system of claim 22, wherein the peer interface comprises:  
 2           an upper interface to interface to at least one of the first upper peer and a second  
 3 peer in a second upper ring at the upper level, the upper interface to forward the request to  
 4 at least one of the first and second upper peers to search the target peer when the target  
 5 peer is not located in the cache.

1           26.     The system of claim 25, wherein the upper interface to receive the request  
 2 from at least one of the first and second upper peers to search the target peer.

1           27.     The system of claim 22, wherein the cache stores information of at least one  
 2 of the first and second lower peers.

1           28.     The system of claim 22, wherein the P2P subsystem further comprising:  
 2 a registrar to process registration of at least one of the current peer to the first upper  
 3 peer and the first lower peer to the current peer, the registration including the information  
 4 on one of the current peer, the first upper peer, and the first lower peer.

1           29.     The system of claim 21, wherein the peer locator comprises:  
 2 an information retriever to retrieve the information of the target peer if the target  
 3 peer is located in the cache.

1           30.     The system of claim 21, wherein the information includes an address of the  
 2 target peer.